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Increased smoking and e-cigarette use among Irish teenagers: A new threat to Tobacco Free Ireland 2025

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Increased smoking and e-cigarette use among Irish teenagers: a new threat to Tobacco Free Ireland 2025

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To the Editor:

Tobacco Free Ireland is an Irish Government policy which demands that the prevalence of tobacco smoking in Ireland be less than 5% by 2025. From 1995 to 2015, teen smoking decreased from 41% in 1995 to 13.1% in 2015, and SimSmoke modelling suggested that the 5% 2025 target was achievable in this group [1]. But, in 2019, current smoking (smoked in the past 30 days) increased overall from 13.1% in 2015 to 14.4% in 2019, with the increase being greater in boys than girls (16.2% versus 12.8%) [2]. This threatens the *Tobacco Free Ireland* endgame. Here, we draw on data from two waves (2015 and 2019) of the Irish ESPAD (European School Survey Project on Alcohol and other Drugs) to analyse the use of tobacco products by teenagers and offer an explanation for the change.

ESPAD is a cross-sectional survey conducted every 4 years in 35 European countries, including Ireland, on substance use among students aged 15–16 years. We report on two waves of Irish data (2015 and 2019). Stratified random sampling was used to select 50 representative schools from a total of 712 post-primary schools, stratified according to school type, location, gender, religious affiliation, and school-level disadvantage status. Within these, simple random sampling of students born in 1999 (2015 data) and 2003 (2019 data) was carried out, yielding 1493 students in 2015 and 1949 students in 2019. Full descriptions of sampling, ethical approval, data collection procedures, as well as the data cleaning rules, are reported in the ESPAD reports [3, 4].

Current smoking was measured by the question: “How often have you smoked cigarettes (excluding e-cigarettes) during the last 30 days?”: not at all; less than 1 cigarette per week; less than 1 cigarette per day; 1–5 cigarettes per day; 6–10 cigarettes per day; 11–20 cigarettes per day; and more than 20 cigarettes per day. Respondents were defined as current smokers if they had smoked at least once in the last 30 days.

Students were asked about their use of e-cigarettes (“ever-use” recoded never versus ever; “current-use” recoded no versus yes). Sociodemographic variables included gender, father’s and mother’s education, perceived family wealth, and household composition. Variables in the model also included other factors associated with smoking such as truancy (skipping school), access to cigarettes, perceived risk of smoking cigarettes occasionally or regularly (one or more packs a day), and peer smoking, as well as familial regulation and maternal relationship.

Descriptive statistics were used to show differences in sample characteristics from the two waves of the survey (2015 and 2019). Adjusted incidence risk ratios with 95% confidence intervals (IRR (95% CI)) for current smoking were estimated using a Poisson regression analysis and are shown for all respondents and, separately, by gender, with a p-value of less than 0.05 considered statistically significant. All statistical analysis was conducted using STATA version 16 (StataCorp LLC., College Station, TX, USA) and is presented in table 1.

Analyses of sample characteristics show that, between 2015 and 2019, e-cigarette ever-use increased significantly from 23% (n=325) to 37.2% (n=723) (p<0.001), and e-cigarette current-use increased significantly from 10.1% (n=143) to 18.1% (n=351) (p<0.001). As well as a significant rise in e-cigarette use, other significant (p<0.05) differences between 2015 and 2019 (the two survey waves) were that, in



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Smoking prevalence decreased in Irish teenagers in all ESPAD survey waves from 1995 until 2015. However, in ESPAD 2019, current teen smoking and e-cigarette use increased, threatening Ireland’s 5% prevalence tobacco endgame strategy. <https://bit.ly/3yXVAyN>

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TABLE 1 Sample characteristics and Poisson regression results (adjusted incidence risk ratios (IRR)) of factors associated with current smoking in 16-year-olds, based on data from the Irish 2015 and 2019 ESPAD surveys

	Sample characteristics		Poisson regression results current smoking		
	2015 n (%)	2019 n (%)	Total adjusted IRR (95% CI)	Male adjusted IRR (95% CI)	Female adjusted IRR (95% CI)
Year					
2015	1472		1	1	1
2019		1947	0.91 (0.85–0.98)*	0.91 (0.82–1.00)	0.95 (0.86–1.05)
Gender					
Male	752 (51.1)	946 (48.5)	1		
Female	720 (48.9)	1003 (51.4)	1.00 (0.93–1.07)	N/A	N/A
Ever-used e-cigarettes					
No	1088 (77.0)	1219 (62.7)*	1	1	1
Yes	325 (23.0)	723 (37.2)	1.27 (1.16–1.40)*	1.33 (1.17–1.51)*	1.27 (1.11–1.45)*
Current use e-cigarettes					
No	1270 (89.9)	918 (84.5)*	1	1	1
Yes	143 (10.1)	351 (18.1)	1.45 (1.31–1.61)*	1.39 (1.21–1.60)*	1.49 (1.26–1.75)*
Father's education					
Primary/some secondary school	388 (30.0)	407 (21.5)*	1	1	1
Completed secondary school	273 (19.0)	345 (18.2)	0.94 (0.84–1.05)	0.97 (0.84–1.13)	0.92 (0.79–1.08)
College/university	600 (41.7)	897 (47.4)	0.95 (0.87–1.04)	1.00 (0.87–1.15)	0.91 (0.80–1.04)
Don't know or N/A	177 (12.3)	244 (13.0)	0.99 (0.86–1.15)	1.01 (0.81–1.26)	1.01 (0.83–1.23)
Mother's education					
Primary/some secondary school	212 (14.7)	215 (11.3)*	1	1	1
Completed secondary school	375 (26.1)	375 (19.7)	0.98 (0.87–1.11)	1.01 (0.84–1.21)	0.93 (0.79–1.11)
College/university	719 (50.0)	1140 (60.0)	0.99 (0.89–1.11)	0.98 (0.83–1.16)	0.98 (0.84–1.15)
Don't know or N/A	132 (9.2)	169 (8.9)	0.92 (0.77–1.10)	0.92 (0.71–1.18)	0.92 (0.70–1.21)
Perceived wealth					
About the same	696 (48.7)	815 (43.3)*	1	1	1
Much better off	223 (15.6)	308 (16.4)	1.09 (0.98–1.20)	1.14 (0.99–1.31)	1.04 (0.89–1.21)
Better off	370 (25.9)	580 (30.8)	1.00 (0.91–1.08)	1.00 (0.89–1.13)	1.00 (0.88–1.13)
Less well off	141 (9.9)	179 (9.5)	1.16 (1.04–1.30)	1.17 (1.00–1.37)	1.13 (0.96–1.33)
Household composition					
Single parent	262 (17.8)	371 (19.0)*	1	1	1
Two parents	1109 (75.3)	1490 (76.4)	0.90 (0.83–0.98)*	0.88 (0.78–0.99)*	0.93 (0.82–1.05)
Blended family	101 (6.9)	88 (4.5)	0.84 (0.71–0.99)*	0.87 (0.68–1.11)	0.81 (0.64–1.03)
Familial regulation					
Know always	906 (62.7)	1194 (63.2)	1	1	1
Know quite often	337 (23.3)	455 (24.1)	0.97 (0.89–1.06)	0.97 (0.86–1.09)	0.97 (0.86–1.10)
Know sometimes	128 (8.9)	166 (8.8)	1.16 (1.04–1.30)	1.15 (0.98–1.34)	1.16 (0.98–1.38)
Usually don't know	73 (5.1)	74 (3.9)	1.25 (1.07–1.45)*	1.28 (1.06–1.53)*	1.23 (0.92–1.63)
Relationship with mother					
Satisfied	1251 (87.5)	1621 (86.4)	1	1	1
Neither nor	74 (5.2)	106 (5.6)	1.01 (0.87–1.16)	0.95 (0.77–1.18)	1.06 (0.87–1.28)
Not satisfied	105 (7.3)	150 (8.0)	1.04 (0.92–1.17)	0.99 (0.82–1.18)	1.10 (0.93–1.31)
Skipping school					
None	984 (80.1)	1309 (79.6)	1	1	1
1–4 days	198 (16.1)	286 (17.4)	1.17 (1.07–1.27)*	1.17 (1.03–1.32)*	1.16 (1.03–1.32)*
5 days+	47 (3.8)	50 (3.0)	1.53 (1.32–1.78)*	1.61 (1.33–1.96)*	1.46 (1.14–1.86)*
Access to cigarettes					
Difficult	348 (24.1)	551 (28.4)*	1	1	1
Easy	893 (61.8)	1188 (61.3)	1.07 (0.98–1.18)	1.09 (0.95–1.24)	1.06 (0.94–1.20)
Do not know	205 (14.2)	200 (10.3)	0.93 (0.82–1.07)	0.93 (0.77–1.13)	0.94 (0.78–1.14)
Perceived risk occasional smoking					
No/slight risk	602 (41.4)	777 (40.2)	1	1	1
Moderate/great risk	814 (56.0)	1097 (56.7)	1.00 (0.92–1.07)	0.97 (0.87–1.08)	1.02 (0.92–1.14)
Do not know	37 (2.5)	61 (3.1)	1.22 (0.88–1.70)	1.22 (0.73–2.04)	1.21 (0.78–1.88)
Perceived risk regular smoking					
No/slight risk	169 (11.6)	223 (11.5)	1	1	1
Moderate/great risk	1248 (85.8)	1655 (85.6)	1.00 (0.92–1.07)	1.00 (0.86–1.17)	0.96 (0.81–1.15)
Do not know	37 (2.5)	56 (2.9)	1.22 (0.88–1.70)	1.06 (0.63–1.76)	0.92 (0.57–1.51)

Continued

TABLE 1 Continued

	Sample characteristics		Poisson regression results current smoking		
	2015 n (%)	2019 n (%)	Total adjusted IRR (95% CI)	Male adjusted IRR (95% CI)	Female adjusted IRR (95% CI)
Peer smoking					
None	478 (33.4)	558 (29.8)	1	1	1
A few/some	802 (56.1)	1125 (60.1)	1.00 (0.92–1.08)	0.99 (0.89–1.11)	1.01 (0.90–1.13)
Most/all	150 (10.5)	188 (10.1)	1.20 (1.06–1.35)*	1.08 (0.92–1.28)	1.33 (1.13–1.57)*

ESPAD: European School Survey Project on Alcohol and other Drugs; N/A: not applicable. *: statistical significance at $p < 0.05$.

2019, respondents perceived increased difficulty in accessing cigarettes and increased family wealth, and reported increased parental education.

Sample characteristics that did not change significantly between 2015 and 2019 were perceived risk from occasional or regular smoking, peer smoking, truancy, household composition, familial regulation, and relationship with mother. Students who had ever-used e-cigarettes were significantly more likely to be current smokers and this risk was more pronounced for boys (IRR 1.33, 95% CI 1.17–1.51) than for girls (IRR 1.27, 95% CI 1.11–1.45). Similarly, current-use of e-cigarettes was significantly associated with increased risk of current smoking for both girls and boys and the risk was much higher for girls (IRR 1.49, 95% CI 1.26–1.75) than for boys (IRR 1.39, 95% CI 1.21–1.60).

Students from two-parent and blended families were less likely to be current smokers than those from single-parent families (IRR 0.90, 95% CI 0.83–0.98 and IRR 0.84, 95% CI 0.71–0.99, respectively), significantly so for male students in two-parent families (IRR 0.88, 95% CI 0.78–0.99).

Truancy was significantly associated with current smoking, with students who reported that they skipped five or more days of school being more likely to be current smokers (IRR 1.53, 95% CI 1.32–1.78). Again, the risk was more pronounced for boys (IRR 1.61, 95% CI 1.33–1.96) than for girls (IRR 1.46, 95% CI 1.14–1.86).

Students who reported that most/all of their friends smoked were more likely to be current smokers than were those who had no smoking friends (IRR 1.20, 95% CI 1.06–1.35) and this was more pronounced for girls (IRR 1.33, 95% CI 1.13–1.57) than for boys (IRR 1.08, 95% CI 0.92–1.28).

We examined the increase in current smoking in 15–16-year-olds in Ireland between 2015 and 2019 and found that it was associated with e-cigarette use, truancy, household composition, familial regulation, and peer smoking. Consistent with PERELMAN *et al.* [3] and previous Irish ESPAD findings [2, 4], the risks of current smoking were higher among those who reported truancy and were higher still among boys who reported skipping school more than five times.

Household composition has previously been associated with current smoking [4, 5], with students from two-parent families being less likely to smoke than those from single-parent families. We provide partial confirmation for these findings in relation to boys only, with boys from two-parent families, and also from blended families, being significantly less likely to report current smoking than boys from single-parent families. We confirm our previous findings showing an association between familial regulation and current smoking [4]. We recommend therefore that smoking intervention and prevention programmes be cognisant of family structure as well as gender [6].

Having peers who smoke is positively associated with teenage current cigarette smoking [7, 8]. The risks of smoking are higher for students who report that most or all their friends smoke than for those with no friends who smoke, and higher for girls than for boys. LIU *et al.* [9], in a meta-analysis of 75 longitudinal teen smoking studies, found that having friends who smoke doubles the risk that youths aged 10 to 19 years will smoke. Our findings highlight the importance of making adolescents aware of, and attentive to, the role that friends play in their smoking initiation [10].

In Ireland, successive policy and legislative initiatives have led to teenagers' access to cigarettes decreasing [6]. Our previous studies showed the association between perceived access to cigarettes and current cigarette

smoking among adolescents [1], and our current study shows that teenagers perceive access to cigarettes to have become more difficult.

The significant increase in cigarette smoking among teenagers in Ireland in 2019 suggests that further regulatory restrictions are needed to limit access by teenagers to tobacco products [10, 11]. This could be done by increasing the age for purchase of cigarettes to 21 years of age as has been done elsewhere [12], and also by extending restrictions on where smoking is allowed [10, 13].

Our findings show a negative effect of e-cigarette ever-use on teenagers' likelihood of current smoking. When the model controlled for various factors associated with smoking, e-cigarette ever-use had an additional negative effect, increasing the risks of being a current smoker for both boys and girls. E-cigarette current-use also increased the risk for current smoking for both boys and girls. Our findings support the need for the extension of tobacco control legislation regarding minors to include e-cigarettes. This may be desirable to prevent exposure to second-hand aerosol [14], but also because of the possible renormalisation of smoking [9].

We saw an increase in current cigarette smoking associated with an increasing use of e-cigarettes. Other associated factors did not deteriorate between 2015 and 2019, and access to cigarettes was perceived to have become more difficult during that period. We suggest that our findings highlight the negative impact that increased youth e-cigarette use had on current teenage cigarette smoking. We further suggest that this increase in e-cigarette use by teens poses a threat to the *Tobacco Free Ireland* policy goal of a smoking prevalence less than 5% by 2025 [1].

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References

- 1 Li S, Levy D, Clancy L. Tobacco Free Ireland 2025: SimSmoke prediction for the end game. *Tob Prev Cessat* 2018; 4: 23.
- 2 Sunday S, Keogan S, Hanafin J, et al. ESPAD 2019 Ireland: Results from the European Schools Project on Alcohol and Other Drugs in Ireland. Dublin, TFRI, 2020.
- 3 Perelman J, Leão T, Kunst AE. Smoking and school absenteeism among 15- to 16-year-old adolescents: a cross-section analysis on 36 European countries. *Eur J Public Health* 2019; 29: 778–784.
- 4 Clancy L, Taylor K, Babineau K, et al. ESPAD 2015: European School Survey Project on Alcohol & Other Drugs in Ireland. Ireland, TFRI for the Department of Health, 2016.
- 5 Brown SL, Rinelli LN. Family structure, family processes, and adolescent smoking and drinking. *J Res Adolesc* 2010; 20: 259–273.

- 6 Li S, Keogan S, Clancy L. Does smoke-free legislation work for teens too? A logistic regression analysis of smoking prevalence and gender among 16 years old in Ireland, using the 1995–2015 ESPAD school surveys. *BMJ Open* 2020; 10: e032630.
- 7 Li S, Keogan S, Taylor K, *et al.* Decline of adolescent smoking in Ireland 1995–2015: trend analysis and associated factors. *BMJ Open* 2018; 8: e020708.
- 8 Reid JL, Manske SR, Leatherdale ST. Factors related to adolescents' estimation of peer smoking prevalence. *Health Educ Res* 2007; 23: 81–93.
- 9 Liu J, Zhao S, Chen X, *et al.* The influence of peer behavior as a function of social and cultural closeness: a meta-analysis of normative influence on adolescent smoking initiation and continuation. *Psychol Bull* 2017; 143: 1082–1115.
- 10 Hanafin J, Clancy L. Youth Smoking in Europe Strategies for Prevention and Reduction. Dublin, TFRI, 2019.
- 11 US Department of Health and Human Services. Efforts to prevent and reduce tobacco use among young people. Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General. Atlanta, USDHHS, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2012; pp. 631–845.
- 12 Nuyts PAW, Kuipers MAG, Willemsen MC, *et al.* An increase in the tobacco age-of-sale to 21: for debate in Europe. *Nicotine Tob Res* 2020; 22: 1247–1249.
- 13 Fernandez E, Martinez C. Spain: COVID-19 prompts smoking regulation in streets and terraces. <https://blogs.bmj.com/tc/2020/09/05/spain-covid-19-prompts-smoking-regulation-in-streets-and-terraces/> Date last updated: 5 September 2020.
- 14 Amalia B, Liu X, Lugo A, *et al.* Exposure to secondhand aerosol of electronic cigarettes in indoor settings in 12 European countries: data from the TackSHS Survey. *Tob Control* 2020; 30: 49–56.